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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,719	08/05/2003	Toshio Tsuchiya	520.43000X00	5693
20457	7590	12/13/2005	EXAMINER	
ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873			GIESY, ADAM	
			ART UNIT	PAPER NUMBER
			2656	

DATE MAILED: 12/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/633,719

Applicant(s)

TSUCHIYA ET AL.

Examiner

Adam R. Giesy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 14-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 14-16, 18-22, 24 and 2525 is/are rejected.
- 7) ☒ Claim(s) 17 and 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 1, 14, 18, 19, 24 and 25 are objected to because of the following informalities:

The variable 'N' is defined in claims 1 and 14 to mean the number of write elements (which coincides with the number of tracks in each grouping). However, the variable 'n' is also used in claims 1, 14, 18, 19, 24, and 25 to describe the number of thin film write elements. Examiner believes that the claims should be amended to use the variable 'N' for all limitations dealing with the number of write elements.

Appropriate correction is required.

2. Claim 19 is objected to because of the following informalities:

The last line of the claim reads "...an upper core of the n-th film magnetic write..." Examiner believes that the claim should read "...an upper core of the n-th **thin** film magnetic write..."

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1, 3, 14, 16, 18-20, 22, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usui (US Pat. No. 6,172,831 B1) in view of Ozue et al. (hereinafter 'Ozue' – US Pat. No. 6,801,379 B2).

Regarding claim 1, Usui discloses a magnetic recording and reproducing apparatus of a helical scan system capable of writing or reading signals simultaneously to or from a plurality of tracks while winding a magnetic tape to a rotary drum diagonally (see column 2, lines 13-15), said apparatus comprising: at least one multitrack write head having N (N being an integer of 2 or more) (see Figure 1 – this figure depicts 2 write heads on the same side of the rotary drum) write elements arranged rotary drum along a track width direction in an integral fashion (see Figure 2A – with the direction of the tape, indicated by the arrow labeled 'Dr', it is shown that the write heads 'Wa' and 'Wb' are located at different heights along the width of the tape – the width of the tape is perpendicular to the length or direction of the tape – therefore the heads can be said to be arranged along the width of the tape); and at least one multitrack read head having read elements arranged along the track width direction in an integral fashion formed on the rotary drum (see Figure 2B – with the direction of the tape, indicated by the arrow labeled 'Dr', it is shown that the read heads 'Ra' and 'Rb' are located at different heights along the width of the tape – the width of the tape is perpendicular to the length or direction of the tape – therefore the heads can be said to be arranged along the width of the tape), the number of the read elements being an integral multiple of N (see Figure 1 – this figure depicts 2 read heads on the same side of the rotary drum); wherein the multitrack write head writes signals to a group of N signal tracks aligned parallel on the

magnetic tape during one rotation of the rotary drum (see Figure 3, elements 'Ta' and 'Tb'); wherein the multitrack read head reads the group signal tracks by the use of any one of the read elements (see column 2, lines 10-12). Usui does not disclose the specific structures of the magnetic heads.

Ozue discloses a recording apparatus of a helical scan system wherein the multitrack write head is a multitrack thin film magnetic head comprising plural magnetic write elements formed on a substrate (see Figure 7), wherein an n-th (n being a natural number) thin film magnetic write element and an (n+1)-th thin film magnetic write element are formed on the substrate with a predetermined shift in a track width direction being provided therebetween (Figure 7 – note the shift between elements 2A and 3A) and the magnetic write elements have a structure so that a protection film extending along a direction of film deposition is formed therebetween (see Figure 7, element 11); and wherein the magnetic multitrack read head comprises plural magnetic read elements formed on a substrate, wherein the magnetic read elements are magnetoresistive effect elements and an n-th (n being a natural number) thin film magnetic read element and an (n+1)-th thin film magnetic read element are formed on the substrate with a predetermined distance extending in a track width direction being provided therebetween (see column 8, lines 44-47 – this discloses that the reproduction or read heads can be produced in the same manner as the recording heads as listed above).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the recording and reproducing system as disclosed by

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Usui with the magnetoresistive head structure as disclosed by Ozue, the motivation being to be able to record a staggered or shifted multiple of tracks on a magnetic tape without the magnetoresistive heads interfering with one another during operation.

Regarding claim 3, Usui and Ozue disclose all the limitations of claim 1 as discussed in the claim 1 rejection above. Usui further discloses that the azimuth angles of the write elements of the multitrack write head and the read elements of the multitrack read head are set to an identical value (see Figures 2A and 2B); a read width each of the read elements of the multitrack read head is set to substantially $\frac{1}{2}$ of a signal track width formed on the magnetic tape (column 5, lines 49-55 – see also Figure 2B); repetition interval of the read elements the track width direction set to $\frac{1}{2}$ of a signal track pitch (column 5, lines 49-55 – see also Figure 2B); and the multitrack read head reads signals in accordance with a non-tracking system from the group of signal tracks (column 4, lines 46-54).

Regarding claim 14, Usui discloses a magnetic recording and reproducing apparatus of a helical scan system capable of writing or reading signals simultaneously to or from a plurality of tracks while winding a magnetic tape to a rotary drum diagonally (see column 2, lines 13-15), said apparatus comprising: at least one multitrack write head having N (N being an integer of 2 or more) (see Figure 1 – this figure depicts 2 write heads on the same side of the rotary drum) write elements arranged on the rotary drum along a track width direction in an integral fashion (see Figure 2A – with the direction of the tape, indicated by the arrow labeled 'Dr', it is shown that the write heads 'Wa' and 'Wb' are located at different heights along the width of the tape – the width of

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the tape is perpendicular to the length or direction of the tape – therefore the heads can be said to be arranged along the width of the tape); and at least one multitrack read head having read elements arranged along the track width direction in an integral fashion formed on the rotary drum (see Figure 2B – with the direction of the tape, indicated by the arrow labeled 'Dr', it is shown that the read heads 'Ra' and 'Rb' are located at different heights along the width of the tape – the width of the tape is perpendicular to the length or direction of the tape – therefore the heads can be said to be arranged along the width of the tape), the number of the read elements having L (L being an integer equal to or more than N) (see Figure 1 – this figure depicts 2 read heads on the same side of the rotary drum); wherein the multitrack write head writes signals to a group of N signal tracks aligned parallel on the magnetic tape during one rotation of the rotary drum (see Figure 3, elements 'Ta' and 'Tb'); and wherein the multitrack read head reads the group of N signal tracks by the use of any one of the read elements (see column 2, lines 10-12). Usui does not disclose the specific structures of the magnetic heads.

Ozue discloses a recording apparatus of a helical scan system wherein the multitrack write head is a multitrack thin film magnetic head comprising plural magnetic write elements formed on a substrate (see Figure 7), wherein an n-th (n being a natural number) thin film magnetic write element and an (n+1)-th thin film magnetic write element are formed on the substrate with a predetermined shift in a track width direction being provided therebetween (Figure 7 – note the shift between elements 2A and 3A) and the magnetic write elements have a structure so that a protection film extending

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along a direction of film deposition is formed therebetween (see Figure 7, element 11); and wherein the magnetic multitrack read head comprises plural magnetic read elements formed on a substrate, wherein the magnetic read elements are magnetoresistive effect elements and an n -th (n being a natural number) thin film magnetic read element and an $(n+1)$ -th thin film magnetic read element are formed on the substrate with a predetermined distance extending in a track width direction being provided therebetween (see column 8, lines 44-47 – this discloses that the reproduction or read heads can be produced in the same manner as the recording heads as listed above).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the recording and reproducing system as disclosed by Usui with the magnetoresistive head structure as disclosed by Ozue, the motivation being to be able to record a staggered or shifted multiple of tracks on a magnetic tape without the magnetoresistive heads interfering with one another during operation.

Regarding claims 16 and 22, Usui and Ozue disclose all the limitations of claims 1 and 14 as discussed in the claim 1 and 14 rejections above. Ozue further discloses that the N signal tracks have an identical azimuth angle (column 8, lines 30-37).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the recording and reproducing system as disclosed by Usui with the magnetoresistive head structure as disclosed by Ozue, the motivation being to be able to record using a more uniformed track pattern which would create a

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more densely packed tape so that more data storage would be available on the same medium.

Regarding claims 18 and 24, Usui and Ozue disclose all the limitations of claims 1 and 14 as discussed in the claim 1 and 14 rejections above. Ozue further discloses that a shield member made from a highly magnetic permeable material is formed between the n -th thin film magnetic write head and the $(n+1)$ -th thin film magnetic write element, the shield member having a width larger than those of cores being exposed to sliding surfaces of both of the thin film magnetic write elements and being exposed to the sliding surface (column 4, lines 54-58 – see also Figure 4, elements 6, 8, and 12)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the recording and reproducing system as disclosed by Usui with the magnetoresistive head structure as disclosed by Ozue, the motivation being to obtain better shielding from one write element to another in order to prevent crosstalk.

Regarding claims 19 and 25, Usui and Ozue disclose all the limitations of claims 1 and 14 as discussed in the claim 1 and 14 rejections above. Ozue further discloses that a lower core of $(n+1)$ -th thin film magnetic write element is formed so that the lower core extends in a direction of a sliding surface and at least cover an upper core of the n -th thin film magnetic write element.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the recording and reproducing system as disclosed by Usui with the magnetoresistive head structure as disclosed by Ozue, the motivation

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being to better write tracks on the magnetic medium without cross-writing and write errors.

Regarding claim 20, Usui and Ozue disclose all the limitations of claim 14 as discussed in the claim 14 rejection above. Usui further discloses that the azimuth angles of the write elements of the multitrack write head and the read elements of the multitrack read head are set to an identical value (see Figures 2A and 2B); a read width each of the read elements of the multitrack read head is set to substantially $\frac{1}{2}$ of a signal track width formed on the magnetic tape (column 5, lines 49-55 – see also Figure 2B); repetition interval of the read elements the track width direction set to $\frac{1}{2}$ of a signal track pitch (column 5, lines 49-55 – see also Figure 2B); and the multitrack read head reads signals in accordance with a non-tracking system from the group of signal tracks (column 4, lines 46-54).

5. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usui (US Pat. No. 6,172,831 B1) in view of Ozue et al. (hereinafter 'Ozue' – US Pat. No. 6,801,379 B2) and further in view of Saito (US Pat. No. 5,412,520).

Regarding claim 2, Usui and Ozue disclose all the limitations of claim 1 as discussed in the claim 1 rejection above. Both Usui and Ozue, however, fail to disclose a controller, or pilot signals.

Saito discloses a controller for controlling a magnetic tape feed rate in reading the signals (see column 3, lines 30-53), wherein the write head writes pilot signals having different pilot frequencies to N signal tracks belonging to a group of signal tracks of an identical azimuth, the pilot frequencies of the adjacent signal tracks being different

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from each other (see column 1, lines 46-64 and column 2, lines 52-58 – see also Figure 4); the read head reads the pilot signals from a signal track to be reproduced and another signal track (column 4, lines 46 thru column 5, line 2); and the controller controls the tape feed rate based on a ratio of the pilot signal component to be reproduced (column 3, lines 30-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the magnetic recording and reproducing apparatus of Usui and the reading and recording head as disclosed by Ozue with the control and pilot signals as disclosed by Saito, the motivation being to more accurately reproduce tracks recorded on magnetic tape.

Regarding claim 4, Usui and Ozue disclose all the limitations of claim 1 as discussed in the claim 1 rejection above. Both Usui and Ozue, however, fail to disclose a controller, or servo signals.

Saito discloses a controller for controlling movement of the read head in the track width direction in reading the signals, wherein the write head writes servo signals to predetermined regions of the magnetic tape (see column 3, lines 30-53); the read head reads the servo signals (see column 3, lines 30-53); and the controller detects a tracking shift amount based on timings at which the servo signals to be reproduced are read to control positioning of the read head (see column 3, lines 54-63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the magnetic recording and reproducing apparatus of Usui and the reading and recording head as disclosed by Ozue with the control and

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servo signals as disclosed by Saito, the motivation being to more accurately reproduce tracks recorded on magnetic tape.

6. Claims 15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usui (US Pat. No. 6,172,831 B1) in view of Ozue et al. (hereinafter 'Ozue' – US Pat. No. 6,801,379 B2) and further in view of Fukuda (US Pat. No. 6,278,569).

Regarding claims 15 and 21, Usui and Ozue disclose all the limitations of claims 1 and 14 as discussed in the claim 1 and 14 rejections above. Both Usui and Ozue, however, fail to disclose a certain track with a different track width.

Fukuda discloses a method of recording information on magnetic tape in which the heads are shifted on the same side of the recording drum and record tracks in multiples wherein a width of one of the N signal tracks on the magnetic tape positioned most downstream with respect to a tape running direction is larger than that of other signal tracks (see Figure 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the magnetic recording and reproducing apparatus of Usui and the reading and recording head as disclosed by Ozue with the track formations as disclosed by Fukuda, the motivation being to create a higher density medium that will store more tracks of data without corruption.

Allowable Subject Matter

7. Claims 17 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Claims 17 and 23 are allowable over prior art of record which does not disclose or suggest all of the limitations of claims 1 and 14 (respectively), as well as the further limitation that **the multitrack write head forms signal tracks of M (M being an integer of 2 or more) groups each consisting of N (N being an integer of 2 or more) signal tracks aligned parallel on the magnetic tape during one rotation of the rotary drum, wherein the parallel N signal tracks of one of M groups have an identical azimuth angle, and azimuth angles of the adjacent groups each consisting of the N signal tracks are different from each other.**

Response to Arguments

8. Applicant's arguments with respect to claims 1-4 and 14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Ozue (US Pat. No. 6,922,298 B2) discloses a magnetic recording apparatus that uses helical scanning methods on magnetic tape with a plurality of heads.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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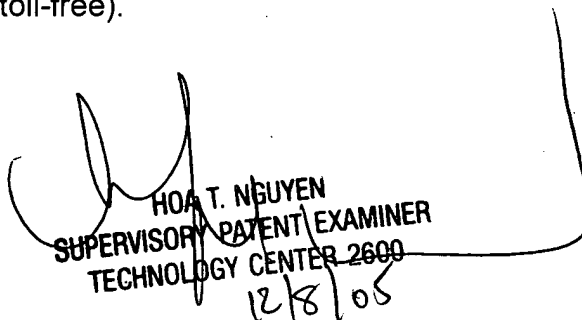
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adam R. Giesy whose telephone number is (571) 272-7555. The examiner can normally be reached on 8:00am- 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ARG 11/30/2005



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